A NEW reaction, of wide general application and of considerable practical utility, by means of which the important organic compounds known as nitriles may be readily prepared in a state of purity, has been discovered by Prof. Michaelis and Dr. Siebert, and is described by them in the current number of *Liebig's Annalen*. As stated in our chemical note of last week, Prof. Michaelis has recently been studying the action of thionyl chloride, $SObl_2$, upon the primary amines, and has shown that the product of the reaction is a thionylamine, a compound formed by the replacement of the two hydrogen atoms of the NH_2 group of the amine by the radical thionyl, SO. In seeking to ascertain whether a similar kind of compound to the thionylamines is formed when thionyl chloride is allowed to act upon the amides of the acid radicles, Prof. Michaelis and Dr. Siebert have discovered the new mode of preparing the nitriles. Instead of a compound of such a nature being produced, a nitrile is the main product, with sulphur dioxide and hydrochloric acid as bye products. As the two latter are gaseous substances, it is at once evident that the reaction must afford a particularly convenient mode of preparing the nitriles in a state of purity. The reaction, moreover, is quite general, and is applicable both in the fatty and in the aromatic series. When thionyl chloride is brought in contact with acetamide, $CH_3 . CO . NH_2$, a violent reaction occurs, with considerable rise of temperature. After a few minutes, however, the violence diminishes, and the liquid eventually becomes quiescent. In order to complete the interaction, the product should then be heated over a water-bath for a few hours, the reaction flask being provided with a reflux condenser. When the fumes of hydrochloric acid and the odour of sulphur dioxide are no longer perceptible, the reaction is completed in accordance with the equation—

$$CH_3 . CO . NH_2 + SObl_2 = CH_3 . CN + SO_2 + 2Hbl.$$

The dark-coloured liquid is then decanted from a small quantity of resinous products of decomposition and distilled, when pure acetonitrile, clear and colourless, passes over it at its boiling point, 82°. The yield of pure nitrile is about half the weight of acetamide employed. The violence of the reaction between thionyl chloride and acetamide is very much diminished by the addition of benzene; but owing to the difficulty of separating the resulting nitrile from the benzene by fractional distillation, it is preferable not to employ it. With care, the direct addition of the thionyl chloride may be made without loss. Propionamide reacts in a very similar manner with thionyl chloride, and almost the whole of the liquid product distils over quite colourless at the boiling point of propionitrile (98°). In like manner, pure benzonitrile may be obtained by the action of thionyl chloride upon the amide of benzoic acid. It is preferable, however, in case of such higher boiling nitriles which can be readily separated from benzene by fractional distillation, to conduct the operation in presence of benzene, the reaction then proceeding much more regularly and without the violence of the direct action. Upon subsequent distillation, the thermometer at once rises to 190° after the distillation of the benzene, and remains constant at that temperature until almost the whole of the benzonitrile has passed over.

NOTES from the Marine Biological Station, Plymouth.—Last week's captures include the Hydroid *Hydractinia echinata*, the Polychæta *Eunice Harassii* and *Siphonostoma uncinatum*, the Polyzoan *Pedicellina cernua*, the Opisthobranchs *Runcina coronata* and *Polycera Lessonii*, the Crustacean *Hyas araneus*, and the Echinoderms *Cucumaria Planci* and *Luidia ciliaris*. The quantity of gelatinous algæ in the Channel waters at length exhibits signs of diminution. Medusæ of the remarkable Hydroid *Corymorpha nutans* (of Allman) have been taken in the tow-nets on several occasions. The medusæ of *Aurelia aurita* are growing rapidly in size, and have now attained an average diameter of 1¼ inches. The *Megalopæ* of *Carcinus* are no longer commonly taken in the tow-nets, but are chiefly to be found in especial haunts at the sea-bottom. The following animals, not hitherto noted, are now breeding: the Hydroids *Plumularia setacea* and *Antennularia ramosa*, the Decapod Crustacea *Crangon fasciatus* and *Hippolyte Cranchii*, the Ophiurid *Amphiura elegans* (= *squamata*), the Ascidian *Styelopsis grossularia*, and several species of Amphipoda and Pantopoda.

THE additions to the Zoological Society's Gardens during the past week include two Mozambique Monkeys (*Cercopithecus pygerythrus*, ♀ ♀) from East Africa, presented respectively by Mr. Arthur James and Miss Maude Parkinson; a Rhesus Monkey (*Macacus rhesus*, ♀) from India, presented by Miss G. Lloyd; a Bonnet Monkey (*Macacus sinicus*, ♀) from India, presented by Mr. R. Hughes; a Macaque Monkey (*Macacus cynomolgus*, ♀) from India, presented by Mr. F. Byfield; an Indian Buffalo (*Bubalus buffelus*, ♀) from India, presented by H.H. The Maharaja of Bhoonagar; a Common Hedgehog (*Erinaceus europæus*) British, presented by Mrs. E. Austen-Leigh; a West African Love-Bird (*Agapornis pullaria*) from West Africa, presented by Lady Theodora Guest; two Herring Gulls (*Larus argentatus*) British, presented by Mr. W. H. Aplin; two Egyptian Mastigures (*Uromastix spinipes*) from Egypt, presented by Mr. Edmund Lamb; a Moorish Tortoise (*Testudo mauritanica*) from North Africa, presented by Mr. T. W. Bayley; seven Green Tree Frogs (*Hyla arborea*) South European, presented by the Rev. C. D. Fothergill; a Silvery Gibbon (*Hylobates leuciscus*) from Malacca, a Roseate Cockatoo (*Cacatua roseicapilla*) from Australia, twenty Green Tree Frogs (*Hyla arborea*) South European, deposited; two Amherst Pheasants (*Thaumalea amherstiæ*, ♀ ♀) from Szechuen, China, a Swinhoe's Pheasant (*Euplocamus swinhoii*, ♂) from Formosa, three Cat Fish (*Amiurus catus*) from North America, purchased; a Common Crowned Pigeon (*Goura coronata*) from New Guinea, received in exchange; a Yak (*Poëphagus grunniens*), ♀), a Water Buck (*Cobus ellipsiprymnus*, ×), an Angora Goat (*Capra hircus. var.* ♂,), a Bennett's Wallaby (*Halmaturus bennetti*, ♂) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

MERIDIAN CIRCLE OBSERVATIONS.—At the meeting of the Royal Astronomical Society, held on April 14 last, the proceedings of which are recorded in the current number (No. 201) of the *Observatory*, the paper prepared by Messrs. Turner and Hollis (and read by the former) entitled, "Comparison of the Greenwich Ten-year Catalogue (1880) with the Cape Catalogue (1880)," was the means of instigating an interesting discussion with reference to questions relating to systematic error of meridian observations. The questions thus raised are of great importance, for, as Dr. Gill remarks, they "affect the objects for which public observatories were founded." Generally speaking the comparison of the catalogues above mentioned seems to have given very satisfactory results, but the series of differences obtained from the north-polar-distances, arranged in order of north polar distance, showed signs of small divergences. The source from which these differences could have arisen seems—since the accuracy of the N.P.D. places depends on the coefficient of refraction—to be at first sight apparent, and Mr. Stone's opinion is that this quantity is "practically mixed up with the question of refraction," his firm conviction being that in the Cape observations there are no systematic errors possible to account for 0″·4. Dr. Gill, in referring to the discussion generally, made some very striking remarks about meridian observations, and was of opinion that at the Cape there were sources of systematic error amounting possibly to half a second of arc. The differences obtained from the reflex and direct observations at the Cape, he says, have led him to the conclusion that they are caused by the fact that, "since the walls of the transit room are

© 1893 Nature Publishing Group

about three feet thick, they retain for a long time the heat which they absorb during the day. The result is that there are layers of air of different temperature in the room at night." To improve fundamental astronomy, half a second of arc, he says, must be seriously taken into account, and this can only be done by employing a sound instrument and a properly-constructed observing-room, "and we have neither the one nor the other at the Cape nor at Greenwich. If we are going to fight for two-tenths or three-tenths of a second, we must set to work *de novo* with better instruments, better housed, for the determination of constant error."

THE LUNAR ATMOSPHERE.—Various are the methods that can be adopted for observing whether the moon has an atmosphere or not, but some of them, such as those that depend on solar eclipses, have been the least often attempted, since they are of an extremely delicate nature. In eclipses, whether partial or total, if the moon really had a moderately dense atmosphere, we should be able, by photographing the sun when partially covered by the moon, to note whether the delicate details on the solar surface in the region of the lunar limb had suffered any slight alterations in their forms. To note such variations it is needless to say that photography must be employed, and further that the photographs must be on a moderately large scale, for if indeed there be changes of form they will by no means be necessarily *very* apparent. For such observations as these no better scale could be used than that adopted by M. Janssen in those wonderful solar pictures that have done much to help us in extending our knowledge of the sun's surface. In fact M. Janssen, in *Comptes Rendus* for April 17 (No. 16) tells us that in order to try this method again several plates were exposed during the recent eclipse of the sun, but owing to the state of the sky the conditions were not very favourable, as these large photographs require a perfectly pure atmosphere. He mentions at the end of his note that he has already made some progress towards the solution of this question from the photographs that were taken at Marseilles during the partial eclipse of July, 1879.

GEOGRAPHICAL NOTES.

THE Berlin Geographical Society has awarded the Humboldt medal, the highest honour it can bestow, to Dr. John Murray, editor of the *Challenger* reports, in recognition of the great advances in physical geography which are associated with his name.

THE Paris Geographical Society has also awarded one of its gold medals to a foreigner, Dr. Fridjof Nansen. Other gold medals given by the Paris Society went to Captain Monteil, for his great journey to Lake Chad, M. Dybowski, for exploration on the Shari, and M. Lentheric for his monograph on the Rhone.

MR. GUY BOOTHBY has recently crossed Australia from north to south. He started from Normanton on the Gulf of Carpentaria in March, 1892, travelled leisurely on horseback or in a waggon to Bourke, and then descended the Darling in a boat, and later a river-steamer to Morgan, thence by rail to Adelaide. The journey occupied rather more than a year, and so far as appears little or no new country was traversed.

THE May number of the *Scottish Geographical Magazine* contains a paper on the people of the Lake Nyasa region, by Mr. D. J. Rankin, in which he makes some serious charges against Mr. H. H. Johnston, the British Commissioner. Mr. Rankin considers the rule of the commissioner to be too severe, and finds fault with his knowledge of the native tribes and their claims to the land.

MR. E. A. FLOYER has a long paper in the *Geographical Journal* on the Eastern Desert of Egypt, illustrated by some very characteristic pictures and a new map, the result of his surveys. The expedition of which he was the leader was sent out by the Egyptian Government in 1891, and surveyed 23,000 square miles of mountainous desert. The region is crossed by a ridge of high ground in the higher peaks of which a few shepherds find a precarious pasture for their flocks, which feed on the comparatively thick growth of acacias. The water-supply is in the form of natural reservoirs of rain, in many cases contained in limestone cavities which keep the wells supplied.

THE Columbus *fête* held in Paris on April 15, the 400th anniversary of the return of Columbus is reported at length in the current number of the *Revue de Géographie*, the main feature being an address by M. Ludovic Drapeyron, who presided. The novelty of such celebrations has passed, and it is difficult to see how the celebration of the fourth centenary of each episode of the life of Columbus after 1492 can be made serviceable to geography or of special interest to the public.

THE RECENT SOLAR ECLIPSE.

WE have already printed a number of telegrams relating to observations of the solar eclipse of April 16 in various parts of the world, and now reproduce from the *Nottingham Daily Guardian* of May 9 an article on the work of the British party in West Africa. This article is contributed by a special correspondent of that journal, who writes from H.M.S. *Blonde*, Las Palmas, April 28. It contains the first detailed information which has appeared on the subject. The writer says:—

The expedition left Liverpool on March 18 by the British and African Company's steamer *Teneriffe*, the company having most generously contracted to convey them to the Gambia at greatly reduced rates. Bathurst, near the mouth of the Gambia, was reached on March 31, when the observers and their instruments were at once transferred to H.M.S. *Alecto*, which had been kindly placed at the disposal of the expedition by the Admiralty. The *Alecto*, being specially designed for service on the West African rivers, was eminently adapted to the purposes of the observers, and, indeed, without some such aid the expedition would have been impracticable. On the afternoon of April 2 the *Alecto* proceeded with the observers to the Salum River, which lies some distance to the north of the Gambia, and Fundium was reached on the following morning. The village, by the way, is called Goundiougne by the French. The chief occupation in this part of Africa is the raising of ground nuts for export. On arrival it was found that M. Deslandres and a small staff from the Paris Observatory had already been at Fundium a fortnight, and had got most of their instruments into position. A neighbouring site, kindly offered to the British party by the Administrator, was at once accepted as satisfying all requirements. It had the advantage of being partially enclosed, and was quite near to one of the wharves, so that the instruments could be put ashore without difficulty. The land around Fundium is very flat, and a perfectly clear horizon was therefore obtained. The site having been selected, plans for the arrangement of the various instruments were at once drawn, and the concrete bases were laid down, the necessary cement having been brought from Liverpool. Huts for the instruments, which had likewise been brought from England, and the instruments themselves were also erected with the least possible delay. In this preliminary work Lieutenant-Commander Lang and his staff, with the readiness characteristic of the British Navy, gave the party all needful assistance.

As eclipse work was new to all the observers, with the exception of Prof. Thorpe, who was in charge of the expedition, the instrumental equipment was such as not to overtax any of them. Prof. Thorpe, assisted by Mr. P. L. Gray, was in charge of a 6-inch equatorial telescope, belonging to Greenwich Observatory, with the necessary accessories for determining the intensity of the light at different points of the corona. The photometer used was of the form in which the amount of light from a glow lamp necessary to cause the disappearance of a grease spot on a piece of paper was determined by measuring the strength of the electric current which illuminates it. A number of such spots were so arranged in the photometer that the image of the corona formed by the telescope fell upon them, while on the other side they were illuminated by a glow lamp, the whole, of course, being inside a dark box. I myself, representing Prof. Norman Lockyer, had the management of a 6-inch photographic telescope, provided with a large prism in front of the object glass for the purpose of determining the chemical constitution of the corona and prominences. With this method of work a separate image of each position of the corona or prominences is obtained corresponding to each kind of light which it emits, and this gives the clue to its chemical character. A duplex telescope for photographing the surroundings of the eclipsed sun was in charge of Sergeant J. Kearney, R.E., who has had the advantage of a long and varied experience in photographic matters.

© 1893 Nature Publishing Group